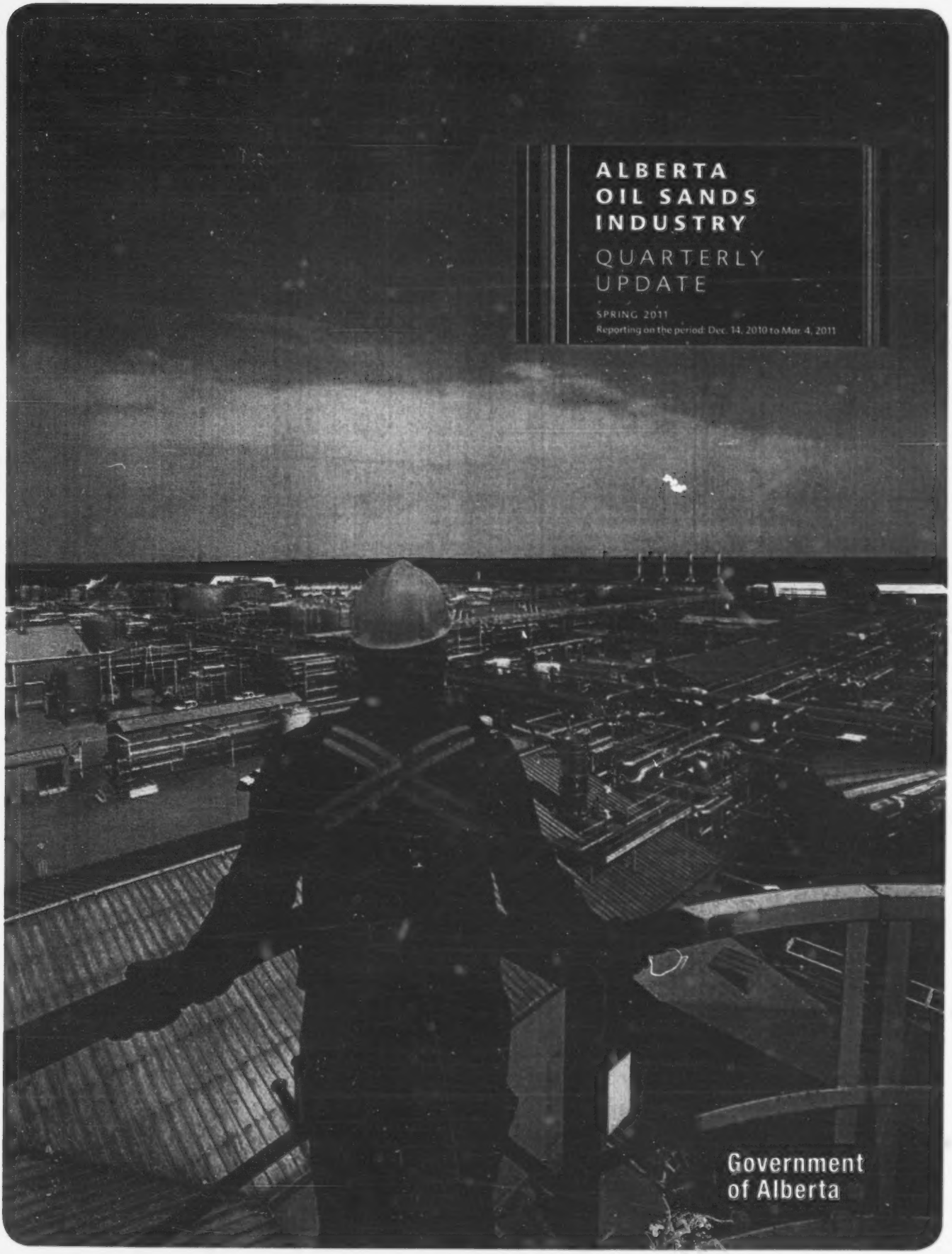

ALBERTA
OIL SANDS
INDUSTRY
QUARTERLY
UPDATE
SPRING 2011
Reporting on the period: Dec. 14, 2010 to Mar. 4, 2011
Government
of Alberta

All about the oil sands

Background of an important global resource

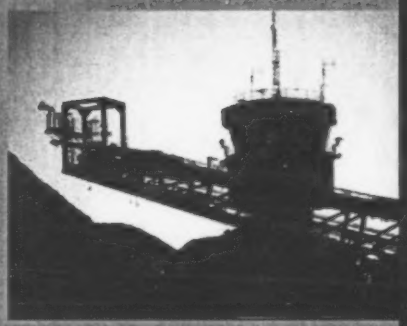


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Alberta has the third largest deposit of oil in the world, next to Saudi Arabia and Venezuela. But 170 billion of Alberta's 179 billion barrels of oil have the special quality of being bitumen, a resource that has been developed for decades but is only now coming into the forefront of the global energy industry, as conventional supplies — so-called "easy" oil — continue to be depleted. The figure of 170 billion barrels represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be increased to as much as 315 billion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is the City of Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

Today bitumen is produced as an energy source by two means — mining and in situ. The majority of oil sands production is done by surface mining, but this will likely change in the future, as 80 per cent of Alberta's bitumen deposits are too deep underground to economically employ this technology.

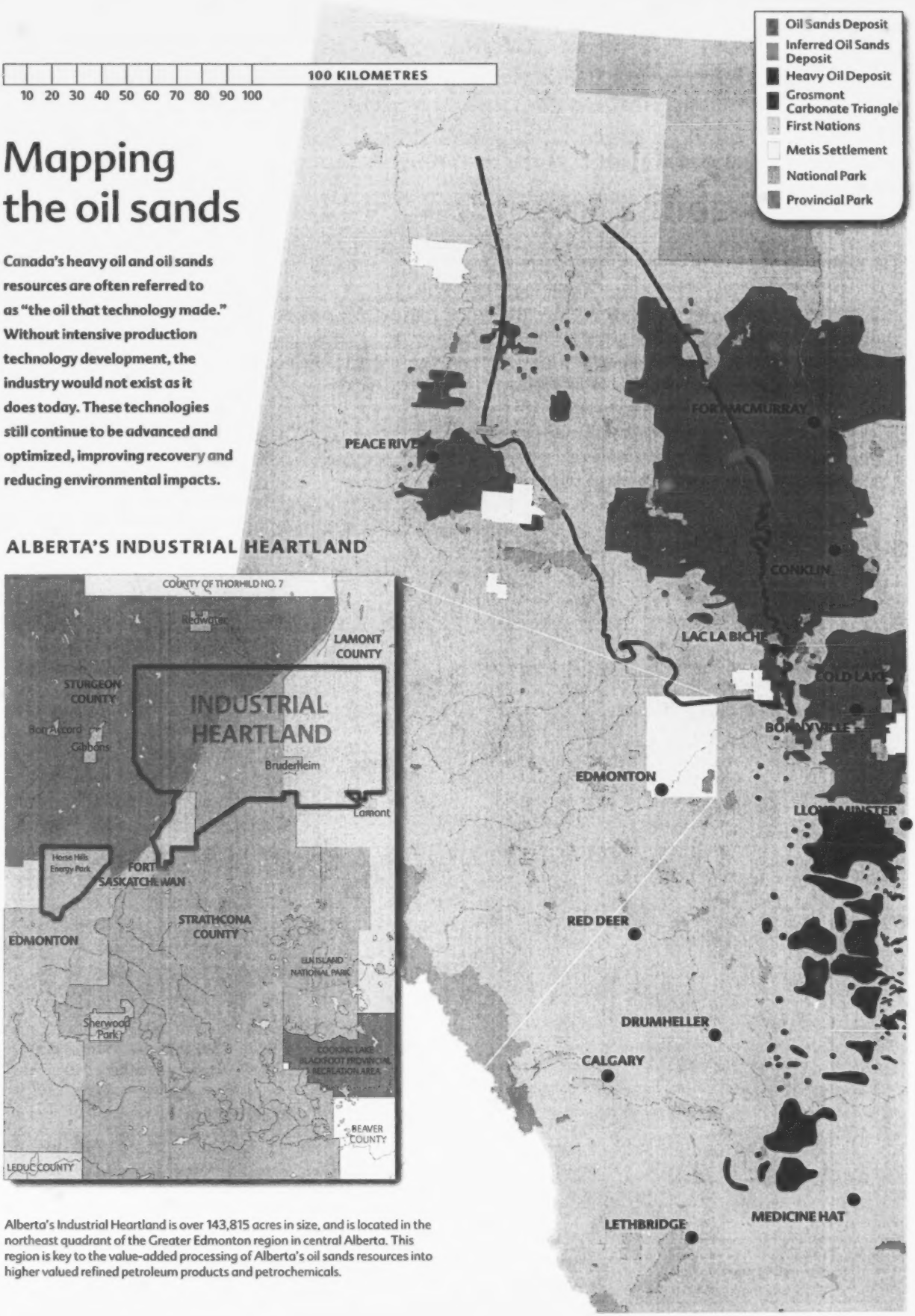
Right now there are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and via gravity, the melted bitumen flows into the lower well and is pumped to the surface using artificial lift.

Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The choice is based on a number of things including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production and minimize water and energy use, including vapour extraction (VAPEX), and a form of in situ combustion known as toe to heel air injection (THAI).

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil (SCO), which is a refinery feedstock. At these refineries it can be transformed into transportation fuels and other products. ■



Mapping the oil sands

Canada's heavy oil and oil sands resources are often referred to as "the oil that technology made." Without intensive production technology development, the industry would not exist as it does today. These technologies still continue to be advanced and optimized, improving recovery and reducing environmental impacts.

Alberta's Industrial Heartland is over 143,815 acres in size, and is located in the northeast quadrant of the Greater Edmonton region in central Alberta. This region is key to the value-added processing of Alberta's oil sands resources into higher valued refined petroleum products and petrochemicals.

Government update



BITUMEN REFINERY AGREEMENT PROMOTES VALUE-ADDED DEVELOPMENT

The Alberta government has successfully negotiated contracts for two projects that will advance upgrading and refining of bitumen in Alberta, increase supplies of diesel fuel and enhance Alberta's position as a secure supplier of clean energy. The first project with the North West Upgrading Inc./Canadian Natural Resources Limited partnership will lead to construction of a new bitumen refinery in Alberta's Industrial Heartland, northeast of Edmonton, as part of the government's Bitumen Royalty in-Kind initiative. Construction of Phase 1 of the bitumen refinery is targeted for completion in mid-2014. It will process 37,500 barrels per day of Crown bitumen for market, in addition to 12,500 barrels per day of bitumen from Canadian Natural. During this first stage, the refinery will produce more than 5.5 million litres per day of ultra–low sulphur diesel while capturing over three thousand tonnes of CO_2 per day.

For the second project, the Alberta government and Enhance Energy Inc. have agreed to terms and conditions specific to the first major carbon capture and storage project in the province. Enhance will build the Alberta Carbon Trunk Line (ACTL), a pipeline that will deliver CO_2 captured from the North West Upgrading refinery and from Agrium Inc., to be used for enhanced oil recovery in existing conventional oilfields. Enhance Energy will transport the CO_2 via the 240-kilometre ACTL pipeline to conventional oil recovery projects throughout central Alberta, where it will be injected into oil reservoirs to make the oil flow more freely.

The two projects will create about 10,000 jobs during construction, plus associated spinoff employment.

GOVERNMENT EXAMINING WAYS TO STRENGTHEN ALBERTA'S PETROCHEMICAL INDUSTRY

Discussions continue between the provincial government and Alberta's petrochemical industry to see if changes to the Incremental Ethane Extraction Program could be made to diversify sources of ethane supply and promote further development of value-added industry in Alberta.

One potential change is to encourage the use of off-gas ethane, which is a by-product of bitumen refining or upgrading. This alternative source of ethane feedstock would help sustain Alberta's petrochemical industry, and at the same time, has the potential to reduce oil sands emissions by up to one million tonnes annually.

Alberta's petrochemical industry depends on ongoing availability of competitively priced ethane to remain viable. Ethane, which is a component of natural gas, is extracted and used as a feedstock in petrochemical production.

Alberta's petrochemical industry is the largest in Canada with annual shipments of almost $9.2 billion and exports of more than $5.4 billion in 2009. The sector employs 7,500 Albertans and helps diversify the labour market as well as add value to Alberta's economy.

ALBERTA TO BETTER INTEGRATE OIL AND GAS POLICY AND REGULATORY SYSTEM

The task force established to review Alberta's regulatory system released a report that highlights coordinated policy development and an integrated regulatory system for upstream oil and gas. The task force report and recommendations include:

- Establishing a new policy management office and ensuring integration of natural resource policies;
- Creating a single oil and gas regulatory body;
- Providing clear public engagement processes;
- Using a common approach to risk assessment and management;
- Adopting performance measures to enable continuous system improvement; and
- Creating a mechanism to help resolve disputes between landowners and companies, and enforce agreements where required.

The review included analyses of all processes in place to develop and ensure compliance with provincial policies around upstream oil and gas development, and extensive engagement of First Nations, the oil and gas industry, and individuals from landowner, municipal and environmental groups. Between March 31 and Oct. 1, 2010, the task force hosted three rounds of engagement through a series of briefings, meetings, workshops and a forum.

The task force was established in March 2010 to lead a comprehensive upstream oil and gas regulatory review and make recommendations to ensure





Alberta has a modern, efficient, outcomes-based and competitive regulatory system that maintains the province's strong commitment to environmental management, public safety and resource conservation. The report and supporting documents are available at www.energy.alberta.ca/Initiatives/RegulatoryEnhancement.asp.

EXPERTS SELECTED TO LEAD OIL SANDS MONITORING

Twelve independent experts from across North America have been chosen to help create a world-class environmental monitoring system for Alberta's oil sands.

Hal Kvisle and Howard Tennant are co-chairs leading the panel. Kvisle is the former president and chief executive officer of TransCanada Corporation, while Tennant is the former president and vice-chancellor of the University of Lethbridge. The remaining panel members represent a broad range of expertise from the scientific, academic, public administration, regulatory and health fields.

Recommendations will be provided for a first-rate environmental monitoring system in northeastern Alberta that spans across all areas—air, land, water and biodiversity—and how such a system can expand throughout the province. The experts will also take into account the work and findings of the federal oil sands advisory panel, the joint government team now examining surface water-quality monitoring and the provincial data review. The panel will report back to the minister of environment by June 2011.

ERCB ADDRESSES STATEMENTS IN NATURAL RESOURCES DEFENSE COUNCIL PIPELINE SAFETY REPORT

The Energy Resources Conservation Board (ERCB) is concerned that a report on pipeline safety issued in February by the Natural Resources Defense Council (NRDC) contains misleading statements on pipeline safety in Alberta and on the characteristics of diluted bitumen. The study includes incorrect statements about pipeline safety in Alberta, including: "The Alberta hazardous liquid pipeline system has a relatively high rate of pipeline failure posing an early indication of the risks dilbit poses to pipeline integrity," and:

"Despite its relatively recent construction, Alberta's hazardous liquid system, which carries a high proportion of diluted bitumen, had over four times as many reportable incidents per mile as the older U.S. system between 1990 and 2005."

These statements are inaccurate. The NRDC's comparison of ERCB data with that collected in the United States is flawed, as it selected data from a much broader array of ERCB pipelines than those included in U.S. data as hazardous liquid pipelines. Additionally, the NRDC did not recognize that the ERCB requires all incidents to be reported, regardless of whether or not any product is spilled, and also regardless of spill volume, whereas in the United States only spills of five barrels of liquids or more are required to be reported.

This results in a misleading comparison of pipeline failure numbers between the United States and Alberta. In the category identified by NRDC—pipelines shipping bitumen and blends of bitumen—the ERCB can identify only three spills resulting from internal corrosion between 1990 and 2005 (and only eight from 1975 to 2010). The resulting average failure frequency for the grouping of crude oil pipelines from 1990 to 2005 is thus 0.03 per 1,000 kilometres per year. This is significantly lower than the U.S. rate quoted in the NRDC study of 0.08 per 1,000 kilometres per year.

The report also states, "There are many indications that dilbit is significantly more corrosive to pipeline systems than conventional crude." Analysis of pipeline failure statistics in Alberta has not identified any significant differences in failure frequency between pipelines handling conventional crude versus pipelines carrying crude bitumen, crude oil or synthetic crude oil.

It should also be emphasized that pipelines in Alberta have never been safer. In 2009, Alberta posted a record-low pipeline failure rate of 1.7 pipeline failures per 1,000 kilometres of pipeline (considering all substances), improving the previous record low of 2.1 set in both 2008 and 2007. ■



What's new in the oil sands

Key updates from spring 2011



Canadian Natural Resources Limited says preliminary target timelines indicate that following a major fire in January, the first set of coke drums at its Horizon mining and upgrading project should resume production in the second quarter of 2011, enabling on-stream production of about half plant capacity or 55,000 barrels per day of synthetic crude oil.

The second set of coke drums are targeted to be on production in the third quarter of this year. All production restarts will be commissioned for service after all required regulatory reviews are complete.

The fire occurred at approximately 3:30 p.m. on January 5 at the top of coke drum 1B (one of four coke drums used on the Horizon site numbered 1A, 1B, 2A and 2B), an area commonly referred to as the cutting deck. The fire burned for approximately three hours and 45 minutes and was allowed to burn itself out, which is the safest way to manage this type of fire, according to Canadian Natural. Five employees were injured.

Labour shortages and inflationary pressures shouldn't be as severe for the oil sands sector as they were during the boom five years ago due to fewer players and less competition from the natural gas side, according to the head of Cenovus Energy Inc.

Brian Ferguson, president and chief executive officer, told a recent Credit Suisse Energy Summit in Vail, Colo., that there's still potential, with stronger oil prices and a recognition of the value of the oil sands, to see higher activity and some congestion.

"[But] there's a number of things that are quite different [this time]," he said, adding that maintaining cost discipline and using a manufacturing approach will be important. "We're certainly not forecasting the kinds of peaks that we saw in terms of labour or other projects. There's a much fewer number of oil sands players. We don't have a period where we had several mining projects trying to come on stream at the same time.... Industry has evolved much more to the [in situ] model where there is much more phased growth, and we also don't have the same competition for capital and for labour from natural gas that we had in the past."

SilverBirch Energy Corporation has announced an increase to its contingent bitumen resource estimates following an independent review attributable to its major mining projects, Frontier and Equinox. Sproule Unconventional Limited has prepared an independent opinion of the contingent bitumen resources of SilverBirch effective as of Dec. 31, 2010. Sproule's work on the Frontier and Equinox projects included a geological evaluation and a technical review of the mine, tailings and extraction plans.

The best-estimate contingent bitumen resource has increased to 2.45 billion barrels for the Frontier project, from 1.45 billion barrels, and to 375 million barrels from 330 million barrels for the Equinox project.

Aecon Group Inc. has announced that change order negotiations on Suncor Energy Inc.'s Firebag Stage 3 central plant facilities (CPF) project will result in significant losses.

While negotiations have not yet concluded, total operating losses on the project will be in the $56 million to $59 million range ($40 million to $42 million after tax), leading to an operating loss in Aecon's industrial segment for the year ended Dec. 31, 2010.

Aecon turned over the Firebag Stage 3 CPF project to Suncor at 2010 year end, and assisted Suncor with transitioning from completing construction to pre-commissioning mode. As such, the impact of project losses is limited to the 2010 fiscal year, and will not affect Aecon's financial results in 2011.

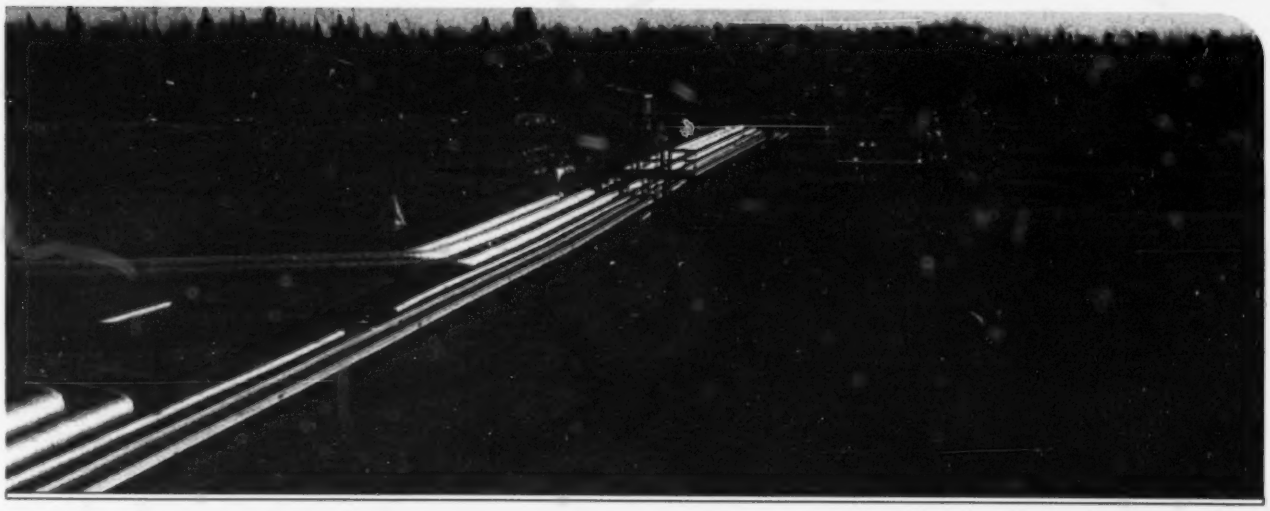
Laricina Energy Ltd. has begun injecting steam into the Grosmont carbonate formation at its Saleski pilot project in northern Alberta.

The company believes the pilot, which has an approved capacity of up to 1,800 barrels a day, is the world's first steam assisted gravity drainage project in the Grosmont carbonate formation, one of Alberta's largest in situ bitumen resources.

Other pilots were done in the northern Alberta bitumen carbonates in the 1970s and 1980s using cyclic steam stimulation. But at the time oil prices were too low and steam-assisted bitumen recovery was in its early days.

Athabasca Oil Sands Corp. says its subsidiary, Dover Operating Corp., has submitted the application to the regulatory authorities for Athabasca Oil Sands' 40 per cent owned Dover commercial project, 70 kilometres northwest of Fort McMurray, Alta.

Athabasca Oil Sands has set a target to become one of the leading in situ bitumen producers. To help achieve this ambitious goal, the board of directors approved a 2011 annual capital budget of $302 million (net) to execute its exploration and development program, including purchasing certain long-lead items for the Hangingstone project, thermal assisted gravity drainage and SAGD testing



of the Dover West carbonates, drilling up to 140 wells, acquiring up to 60 square kilometres of 3-D seismic and acquiring up to 130 kilometres of 2-D seismic.

During the next 15 months, the company also expects to hire 100 new employees to expand its technical and operating capabilities.

■■■ Seven oil sands mining companies have announced that they plan to work together in a unified effort to advance tailings management and to foster innovation and collaboration in research and development relating to tailings. The announcement was made by Canadian Natural Resources Limited, Imperial Oil, Shell Canada Limited, Suncor Energy Inc., Syncrude Canada Ltd., Teck Resources Limited and Total E&P Canada Ltd. Each company has pledged to share its existing tailings research and technology and to remove barriers to collaborating on future tailings research and development. The collaboration is supported by the Canada Mining Innovation Council, an organization focused on the promotion and implementation of mining-related research to meet the needs of Canada's mining and minerals industries. The companies have agreed to the following core principles to guide the actions of the research collaboration:

- Make tailings technical information more broadly available to the industry members, academia, regulators and others interested in collaborating on tailings solutions;
- Collaborate on tailings-related research and development and technology among companies as well as with research agencies;
- Eliminate monetary and intellectual property barriers to the use of knowledge and methods related to tailings technology and research and development; and
- Work to develop an appropriate framework so that tailings information is organized, verified through peer review and kept current.

Existing tailings research and development will form the base of knowledge for the collaboration. Research objectives will be finalized in 2011.

■■■ MEG Energy Corp. has begun horizontal drilling at Phase 2B of its Christina Lake steam assisted gravity drainage (SAGD) project. The final cost estimate of $1.4 billion has been approved by company directors. MEG plans to invest about $900 million in 2011, when it will start facilities construction. That's up from a 2010 capital budget is $629 million. Bill McCaffrey, chairman, president and chief executive officer, says, "Phase 2B is an important step in implementing our strategy of having production capability of 260,000 barrels per day by 2020."

■■■ Shepherding the Clearwater West Phase 1 pilot project application through the regulatory process, beginning detailed engineering and securing funding for the SAGD project will be Alberta Oilsands Inc.'s focus in 2011. The company expects to receive regulatory approval in 2011 and will have to raise approximately $100 million in capital to complete the first phase's construction and commissioning. Alberta Oilsands anticipates financing its capital requirements through a combination of joint venture, debt and/or equity arrangements and asset rationalizations.

■■■ Syncrude Canada is conducting its own investigation into the death of a contractor, suspected to have fallen, at a construction site at its Mildred Lake upgrader near Fort McMurray, Alta. On December 1 at about 11:30 a.m., Syncrude's emergency crews found the man unresponsive and pronounced him dead at the scene, says spokeswoman Cheryl Robb. Occupational Health and Safety and RCMP have also been investigating. Syncrude is not releasing any personal details. Says Robb, "It appears it was a fall, but we're not sure if anybody saw what happened so that's part of our investigation." ➤





■■ Taking to heart lessons learned from the cost overruns on the $9.7-billion first phase of its Horizon oil sands mine, Canadian Natural Resources Limited has overhauled its project execution strategy as it plans an expansion to 250,000 barrels per day of synthetic light crude. Debottlenecking and expansion will be combined, and the expansion from the current 110,000 barrels per day will be broken up into the five major components. These will be further divided into 46 individual projects that the company can start and stop at its discretion, says Canadian Natural president Steve Laut.

■■ Grizzly Oil Sands ULC has announced results of a new bitumen resource assessment prepared by GLJ Petroleum Consultants Ltd. Properties that will be explored this winter were not included in the evaluation. Proved-plus-probable reserves for the Algar Lake project were estimated at 98 million barrels. The company expects that construction of the first phase of the Algar Lake steam assisted gravity drainage project will commence in the third quarter of 2011, and it plans to conduct an extensive exploration program in the first quarter.

■■ SNC-Lavalin Group Inc. has announced that it has been awarded a contract to design, build, operate and maintain a workforce lodge for oil sands workers in Fort McMurray, Alta. This lodge will provide accommodation and recreational facilities for 2,500 workers during the construction phase of a major oil sands project. The contract also includes the turnkey provision of site preparation, pilings, water and waste water treatment facilities and backup power generation, as well as the provision of catering and support services at the lodge over the construction period. On-site construction is currently underway.

■■ Southern Pacific Resource Corp. has announced a public offering, on a "bought deal" basis, of $150-million principal amount of convertible unsecured subordinated debentures with an interest rate of six per cent per annum, payable semi-annually on the last day of June and December. Southern Pacific intends to use the proceeds of the offering to fund the development of its STP-McKay bitumen project. STP-McKay has design capacity of 12,000 barrels per day of bitumen treatment and 33,600 barrels per day of steam generation. The company expects, based on its own projections and third-party assessments, that STP-McKay will cost $408 million or $34,000 per barrel.

■■ Two oil sands mining projects proposed by Shell Canada Limited that will produce 300,000 barrels per day of bitumen will undergo environmental assessments by independent review panels, reports the Canadian Environmental Assessment Agency (CEAA). The federal government and the Energy Resources Conservation Board are discussing the possible establishment of joint review panels to assess these proposed projects. A draft version of the joint review panel agreements will be made available for public comment prior to being finalized. CEAA will make funding available to assist the public and Aboriginal groups to participate in the environmental reviews. An announcement on participant funding will be made at a later date.

■■ Petrobank Energy and Resources Ltd. has announced the termination of licensing negotiations with a third-party international oil company (IOC). Petrobank says it has concluded that the ultimate execution of this agreement has been unreasonably protracted as the IOC has had a final version of the agreement, executed by Petrobank, since July 2010. No technical aspects of the toe to heel air injection (THAI) technology have been at issue. "We have, therefore, determined that it is in Petrobank's best interest to focus on our other licensing opportunities," the company says. "By terminating negotiations with this IOC, we are now able to initiate discussions with other parties operating in the same geographic region, who have also indicated strong interest in the THAI technology." ■

Project listings

Updated status of oil sands projects in Alberta

As of March 4, 2011.

TECHNOLOGY LEGEND

COGD	Combustion overhead gravity drainage
CSS	Cyclic steam stimulation
ET-DSP	Electro-thermal dynamic stripping process
N-SOLV	Heated solvent vapour extraction
SAGD	Steam assisted gravity drainage
THAI	Toe to heel air injection

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH ATHABASCA REGION—MINING				
CANADIAN NATURAL RESOURCES LIMITED				
Production suspended as regulators investigate the cause of major fire January 6. Canadian Natural says it expects no production from the site in February.				
Phase 1	135,000		Operating	Mining
Phase 2/3 - Phase 2A	TBD	TBD	Approved	Mining
Phase 2/3 - Phase 2B	TBD	TBD	Approved	Mining
Phase 2/3 - Phase 3	TBD	TBD	Approved	Mining
Phase 2/3 - Tranche 1	TBD	TBD	Operating	Mining
Phase 2/3 - Tranche 2	TBD	TBD	Construction	Mining
Phase 4	145,000	TBD	Announced	Mining
Phases 2/3	135,000	TBD	Approved	Mining
IMPERIAL OIL LIMITED				
Imperial says that construction on the first phase of Kearl is more than 50 per cent complete and is progressing on schedule with expected start-up in 2012.				
Phase 1	110,000		Construction	Mining
Phase 2	100,000	TBD	Approved	Mining
Phase 3	100,000	TBD	Approved	Mining
SHELL ALBIAN SANDS				
Mining operations successfully started up in September 2010.				
Expansion	100,000	TBD	Application	Mining
Phase 1A	100,000	2010	Operating	Mining
Phase 1B	100,000	TBD	Approved	Mining
Muskeg River				
Commercial	155,000	2002	Operating	Mining
Expansion & Debottlenecking	115,000	TBD	Approved	Mining
Pierre River				
Phase 1	100,000	2018	Application	Mining
Phase 2	100,000	TBD	Application	Mining
SILVERBIRCH ENERGY CORPORATION				
Regulatory approval possible in 2014.				
Phase 1	80,000	TBD	Announced	Mining
Phase 2	80,000	TBD	Announced	Mining
Phase 3	80,000	TBD	Announced	Mining
Phase 4 Equinox	50,000	TBD	Announced	Mining

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
SUNCOR ENERGY INC.				
Suncor says that higher bitumen rates from its mining and in situ operations, combined with improved upgrader reliability, resulted in record oil sands production rates in the fourth quarter of 2010.				
Millennium Debottlenecking	23,000	2008	Operating	Mining
Millennium Mine	294,000	2002	Operating	Mining
North Steepbank Extension	180,000	2010	Construction	Mining
Steepbank Debottleneck Phase 3	4,000	2008	Operating	Mining
Fort Hills				
Subject to sanction, Suncor and new venture partner Total will go ahead with the mining portion of the Fort Hills project, targeting a 2016 start-up. Suncor will spend $100 million on Fort Hills in 2011.				
Debottleneck	25,000	2012	Approved	Mining
Phase 1	165,000	2016	Approved	Mining
Voyageur South				
Phase 1	120,000	TBD	Application	Mining
SYNCRUDE CANADA LTD.				
Canadian Oil Sands reports that 2010 production volumes were the second highest on record. The Syncrude project has a calculated capital budget of $2.4 billion for 2011, which will include the relocation or replacement of four out of five mine trains, completion of the Syncrude Emissions Reduction Project, tailings management and regular maintenance.				
Aurora South Train 1	100,000	2010	Approved	Mining
Aurora South Train 2	100,000	2012	Approved	Mining
Base Mine Stage 1 & 2 Expansion	290,700	2078	Operating	Mining
Stage 3 Expansion	116,300	2006	Operating	Mining
TOTAL E&P CANADA LTD.				
Subject to regulatory approval and sanction, Total and new partner Suncor Energy will proceed with Joslyn, targeting a 2018 start-up.				
Phase 1	100,000	2018	Approved	Mining
Joslyn South Mine				
Phase 1	100,000	TBD	Announced	Mining
Northern Lights Mine				
Phase 1	57,250	TBD	On Hold	Mining
Phase 2	57,250	2020	On Hold	Mining

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
NORTH ATHABASCA REGION—IN SITU				
ATHABASCA OIL SANDS CORP.				
Dover				
AOSC filed its regulatory application for a 250,000-barrel-per-day project at Dover in December 2010. It has also received regulatory approval for a two-well winter test of thermal assisted gravity drainage (TAGD), which incorporates conductive heating.				
Phase 1	50,000	[illegible]	Application	SAGD
Subsequent Phases	200,000	[illegible]	Application	SAGD
Dover West Clastics				
Phase 1	12,000	2015	Announced	SAGD
Phase 2	25,000	2018	Announced	SAGD
Phase 3	35,000	2021	Announced	SAGD
Dover West Lower Carbonates				
Subsequent phases will likely be sized between 25,000 and 35,000 barrels per day.				
Phase 1 Demonstration	12,000	[illegible]	Announced	SAGD
Muskeg River				
Commercial application on schedule for approval in late 2011 or early 2012.				
Phase 1	35,000	[illegible]	Application	SAGD
Phase 2	40,000	2017	Application	SAGD
Phase 3	40,000	2019	Application	SAGD
Phase 4	35,000	TBD	Application	SAGD
CANADIAN NATURAL RESOURCES LIMITED				
Birch Mountain				
Phase 1	60,000	2018	Announced	TBA
Phase 2	60,000	2023	Announced	TBA
CENOVUS ENERGY INC.				
Telephone Lake Borealis				
Cenovus is awaiting regulatory approval and is working with regulators to provide additional information. More information about the geology of the reservoir continues to be collected.				
Phase A	35,000	[illegible]	Application	SAGD
Phase B	15,000	TBD	Announced	SAGD
E-T ENERGY LTD.				
Poplar Creek				
Small test ongoing. Next stage of testing (100-200 bbls/d) expected in spring 2011. E-T anticipates regulatory approval for commercial project in 2011.				
Commercial	10,000	[illegible]	Application	ET-DSP
Pilot	TBD	2007	Operating	ET-DSP
HUSKY ENERGY INC.				
Sunrise				
Development drilling commenced in the first quarter of 2011. Husky has initiated conceptual development engineering for subsequent phases and is expecting a comprehensive full-field plan to be in place by the end of 2011.				
Phase 1	60,000	[illegible]	Construction	SAGD
Phase 2	50,000	2014	Approved	SAGD
Phase 3	50,000	2015	Approved	SAGD
Phase 4	50,000	2018	Approved	SAGD
IVANHOE ENERGY INC.				
Tamarack				
Application filed November 2010.				
Phase 1	20,000	2016	Application	SAGD
Phase 2	20,000	TBD	Application	SAGD
ROYAL DUTCH SHELL PLC				
Grosmont				
The project, which would incorporate electrical heaters, has been delayed.				
Pilot	TBD	TBD	On Hold	SAGD

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
SOUTHERN PACIFIC RESOURCE CORP.				
STP-McKay				
Southern Pacific has completed the financing agreements for full funding for Phase 1 of the STP-McKay thermal project. Construction underway.				
Phase 1	12,000	[illegible]	Construction	SAGD
Phase 2	12,000	TBD	Announced	SAGD
SUNCOR ENERGY INC.				
Firebag				
Suncor says that higher bitumen supply from its in situ projects and greater upgrader reliability led to record production rates in the fourth quarter of 2010. Firebag Phase 3 is expected to commence production in the second quarter, then construction will shift fully to Phase 4.				
Cogeneration and Expansion	25,000	[illegible]	Operating	SAGD
Phase 1	35,000	2004	Operating	SAGD
Phase 2	35,000	2006	Operating	SAGD
Phase 3	68,000	2011	Construction	SAGD
Phase 4	68,000	2013	Construction	SAGD
Phase 5	68,000	2018	Approved	SAGD
Phase 6	68,000	2019	Approved	SAGD
Lewis				
Phase 1	40,000	TBD	Application	SAGD
Phase 2	40,000	TBD	Application	SAGD
MacKay River				
Suncor says that higher bitumen supply from its in situ and mining projects and greater upgrader reliability resulted in record production rates in the fourth quarter of 2010. The company has confirmed that the MacKay River expansion is a key part of its near-term plans, and will spend $70 million on the project in 2011.				
Phase 1	33,000	[illegible]	Operating	SAGD
Phase 2	40,000	2016	Announced	SAGD
SUNSHINE OILSANDS LTD.				
Harper				
Sunshine Oilsands has closed a $210-million financing. It has also commenced steaming at the Harper carbonate project, and reports it has progressed the West Ells project application, and commenced formal preparation for applications relating to Legend Lake and Thickwood.				
Carbonate Pilot	1,000	[illegible]	Operating	SAGD
Legend Lake				
Sunshine Oilsands has increased its oil sands lease holdings to 1,086,393 acres—it was the only purchaser of land at the January 12 oil sands land sale.				
Phase 1	10,000	[illegible]	Announced	SAGD
Phase 2	10,000	TBD	Announced	SAGD
Phase 2 Expansion	10,000	TBD	Announced	SAGD
Phase 3	20,000	TBD	Announced	SAGD
Phase 3 Expansion	10,000	TBD	Announced	SAGD
Thickwood				
Phase 1	10,000	2016	Announced	SAGD
Phase 2	20,000	2017	Announced	SAGD
Phase 2 Expansion	20,000	2020	Announced	SAGD
West Ells				
Construction on Phase 1 is expected to commence in 2011.				
Phase 1	5,000	2012	Application	SAGD
Phase 2	5,000	2015	Application	SAGD
Phase 3	40,000	2018	Announced	SAGD
Phase 4	40,000	TBD	Announced	SAGD
TOTAL E&P CANADA LTD.				
Joslyn				
Phase 1	2,000	2004	Suspended	SAGD
Phase 2	10,000	2006	Suspended	SAGD

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
VALUE CREATION INC.				
Terre de Grace				
Phase 1	40,000	TBD	Announced	SAGD
Phase 2	40,000	TBD	Announced	SAGD
Pilot	10,000	2011	Approved	SAGD

SOUTH ATHABASCA REGION—IN SITU

ALBERTA OILSANDS INC.

Clearwater West

Alberta Oilsands submitted a substantive project update to the ERCB and Alberta Environment in late December 2010, also providing responses to supplemental information requests. The update includes details on stakeholder consultation and technical work on reservoir and caprock characteristics that have been completed since regulatory filing. The company expects to receive regulatory approval in 2011.

Phase 2	10,000		Announced	SAGD
Pilot	4,500	2012	Application	SAGD

ATHABASCA OIL SANDS CORP.

Hangingstone

Regulatory application to be submitted second half of 2011.

Phase 1	12,000		Announced	SAGD
Phase 2	25,000	2016	Announced	SAGD
Phase 3	25,000	2018	Announced	SAGD

Hangingstone Pilot

Excelsior Energy was acquired by Athabasca Oil Sands Corp. in November 2010.

Experimental Combustion Pilot	1,000		Application	COGD

BLACKPEARL RESOURCES INC.

Blackrod

BlackPearl is preparing a regulatory application for a commercial 40,000-barrel-per-day project, to be developed in phases. Target filing is in the first quarter of 2012. Facility construction on first phase expected to be complete in April 2011, with first steam injection targeted for the second quarter.

Commercial	40,000		Announced	SAGD
Pilot	500	2011	Construction	SAGD

CANADIAN NATURAL RESOURCES LIMITED

Gregoire Lake

Phase 1	60,000	2022	Announced	TBA

Grouse

Commercial	60,000	2018	Announced	SAGD

Kirby

Initial field development includes 47 SAGD horizontal well pairs with 16 of them to be drilled in 2011. Project may include a Phase 2 Debottleneck in 2024.

Phase 1	40,000	2012	Construction	SAGD
Phase 2	TBD	2016	Announced	SAGD

Kirby (Enerplus)

Canadian Natural Resources purchased Enerplus' Kirby assets for $405 million in October 2010.

Phase 1	10,000	2012	Application	SAGD
Phase 2	25,000	2017	Announced	SAGD

Lebreux

Commercial	30,000	2020	Announced	SAGD

CENOVUS ENERGY INC.

Christina Lake

Cenovus reports that net production at Christina Lake and Foster Creek increased by 33 per cent in the fourth quarter 2010 versus the fourth quarter of 2009. Construction on Phase C is nearing completion, and construction on Phase D is well underway. Engineering for Phase E and preliminary site clearing for Phase F is expected to start in 2011. Cenovus will spend up to $400 million at Christina Lake in 2011.

Phase 1A	10,000	2007	Operating	SAGD
Phase 1B	8,800	2008	Operating	SAGD
Phase C	40,000	2011	Construction	SAGD
Phase D	40,000	2013	Construction	SAGD
Phase E	40,000	2014	Application	SAGD
Phase F	40,000	2016	Application	SAGD
Phase G	40,000	2017	Application	SAGD
Phase H	40,000	2017	Application	SAGD

Foster Creek

Interim funding for Phase F has been approved by Cenovus and ConocoPhillips, with final approval for Phases F-H expected this year. Engineering, procurement and site preparation are continuing. Preliminary plant construction is expected in 2011. Cenovus will spend up to $400 million at Foster Creek in 2011.

Phase A	24,000		Operating	SAGD
Phase B Debottleneck	6,000	2003	Operating	SAGD
Phase C Stage 1	10,000	2005	Operating	SAGD
Phase C Stage 2	20,000	2007	Operating	SAGD
Phase D	30,000	2009	Operating	SAGD
Phase E	30,000	2009	Operating	SAGD
Phase F	30,000	2014	Approved	SAGD
Phase G	30,000	2016	Approved	SAGD
Phase H	30,000	2017	Approved	SAGD
Phase I	25,000	2019	Announced	SAGD

Grand Rapids

Single well pair SAGD pilot underway. Steaming started in December and early results are expected in the first half of 2011. If successful, Cenovus will file a commercial application in 2011.

Phase A	60,000	2017	Announced	SAGD
Phase B	60,000	TBD	Announced	SAGD
Phase C	60,000	TBD	Announced	SAGD
Pilot	600	TBD	Operating	SAGD

Narrows Lake

Narrows Lake is now jointly owned with ConocoPhillips. Cenovus will spend up to $200 million on emerging projects in 2011, including Narrows Lake.

Phase 1	43,333	2013	Application	SAGD
Phase 2	43,333	TBD	Announced	SAGD
Phase 3	43,334	TBD	Announced	SAGD

CONNACHER OIL AND GAS LIMITED

Great Divide

Connacher reports that during the month of January 2011 it restricted its bitumen production at Great Divide by about 15 per cent of December levels due to limited access to storage facilities, sales terminals, crude oil delivery trucks and sales pipelines. It also temporarily scaled back production at Algar to facilitate the planned installation of downhole pumps in three wells.

Algar Pod 2	10,000	2008	Operating	SAGD
Expansion	24,000	2012	Application	SAGD
Pod 1	10,000	2007	Operating	SAGD

CONOCOPHILLIPS CANADA LIMITED

Surmont

Earthworks ongoing for Phase 2. ConocoPhillips says that during the fourth quarter of 2010, the sale of certain non-strategic assets allowed it to reallocate capital to higher margin projects such as Canadian oil sands.

Phase 1	27,000	2007	Operating	SAGD
Phase 2	83,000	2015	Construction	SAGD
Pilot	1,200	1997	Operating	SAGD

DEVON CANADA CORPORATION

Jackfish

Jackfish 2 construction is now complete. Steam injection to begin in the second quarter, with first oil expected by the end of 2011. Corporate sanction already in hand for Jackfish 3, for which an application was filed during the fourth quarter of 2010.

Jackfish 1	35,000	2007	Operating	SAGD
Jackfish 2	35,000	2011	Operating	SAGD
Jackfish 3	35,000	2015	Application	SAGD

Kirby-Pike

Commercial	TBD	2017	Announced	SAGD

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
GRIZZLY OIL SANDS ULC				
Algar Lake				
Grizzly plans lump-sum bidding of module fabrication in 2011.				
Phase 1	5,000	2013	Application	SAGD
Phase 2	5,000	2014	Application	SAGD
HARVEST OPERATIONS CORP.				
BlackGold				
Harvest plans to spend $240 million on BlackGold in 2011, with $190 million on the design and construction of the plant, and $50 million on production well pairs and observation wells.				
Phase 1	10,000	2013	Construction	SAGD
Phase 2	20,000	2015	Application	SAGD
HUSKY ENERGY INC.				
Sunrise				
Construction will be proceeding in the first quarter of 2011, with ignition scheduled for late in the second quarter. Husky intends to use the heat generated from the combustion front from an air injection well to facilitate bitumen movement.				
Thermal Conduction Pilot	755	2011	Approved	SAGD
JAPAN CANADA OIL SANDS LIMITED				
Hangingstone				
JACOS anticipates regulatory approval for Phase 1 expansion in the third quarter of 2011.				
Expansion	35,000	2017	Application	SAGD
Hangingstone Pilot				
Pilot	11,000	1999	Operating	SAGD
LARICINA ENERGY LTD.				
Saleski				
Commercial Demonstration Phase 1	5,000	2012	Construction	SAGD
Phase 2	30,000	2014	Announced	SAGD
Saleski				
Laricina commenced steam injection at Saleski in December 2010. The project is designed to help confirm the Grosmont carbonates as an economic foundation for SAGD.				
Phase 1	10,700	2013	Announced	SAGD
Pilot	1,800	2011	Operating	SAGD
MEG ENERGY CORPORATION				
Christina Lake				
MEG is reporting bitumen production in excess of plant capacity during the fourth quarter of 2010, with a steam to oil ratio lower than design. The company has commenced drilling at Phase 2B and will commence facilities construction in 2011. The expansion is expected to cost $1.4 billion.				
Phase 1 Pilot	3,000	2006	Operating	SAGD
Phase 2	22,000	2009	Operating	SAGD
Phase 2B	35,000	2013	Construction	SAGD
Phase 3A	50,000	2016	Application	SAGD
Phase 3B	50,000	2018	Application	SAGD
Phase 3C	50,000	2020	Application	SAGD
Surmont				
Regulatory application to be filed for a 100,000-barrel-per-day project in the second quarter 2011.				
Phase 1	50,000	2016	Announced	SAGD
Phase 2	50,000	TBD	Announced	SAGD
N-SOLV CORPORATION				
Hangingstone				
Demonstration Plant	2,000	TBD	Announced	N-SOLV

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
NEXEN INC.				
Long Lake				
Although the bitumen production side of the Long Lake project continues to experience operational difficulties, partner OPTI Canada is reporting that upgrader units are performing consistently. Despite a brief interruption in November due to a gasifier trip, on-stream time averaged 90 per cent for the fourth quarter, up from 81 per cent in the third.				
Long Lake South Phase 1	40,000		Approved	SAGD
Long Lake South Phase 2	40,000	TBD	Approved	SAGD
Phase 1	72,000	2008	Operating	SAGD
Phase 2	72,000	2012	Approved	SAGD
Phase 3	72,000	2015	Announced	SAGD
Phase 4	72,000	2018	Announced	SAGD
PARAMOUNT RESOURCES LTD.				
Aug				
Application to be filed in 2011.				
Commercial	TBD		Announced	SAGD
PETROBANK ENERGY AND RESOURCES LTD.				
May River				
May River is in final detailed engineering, and orders have been placed for some long-lead equipment.				
Phase 1	10,000		Application	THAI
Subsequent Phases	90,000		Disclosed	THAI
Whitesands				
Petrobank says it is planning to test oxygen enrichment and CO_2 re-injection in 2011.				
Expansion	1,900		Approved	THAI
Pilot	1,900	2006	Operating	THAI
STATOIL				
Corner				
Commercial	40,000	2017	Application	SAGD
Expansion	40,000	2019	Application	SAGD
Hangingstone				
Commercial	20,000	2018	Application	SAGD
Kai Kos Dehseh Leismer				
First production achieved. According to the ERCB, production averaged about 870 barrels per day in November 2010.				
Leismer Demonstration	10,000		Operating	SAGD
Leismer				
Commercial	20,000	TBD	Application	SAGD
Expansion	20,000	TBD	Application	SAGD
Northwest Leismer				
Commercial	20,000	2018	Application	SAGD
South Leismer				
Commercial	20,000	2024	Application	SAGD
Thornbury				
Commercial	40,000	2012	Application	SAGD
Expansion	20,000	2017	Application	SAGD
SUNCOR ENERGY INC.				
Chard				
Phase 1	40,000	TBD	Announced	SAGD
Meadow Creek				
Phase 1	40,000	TBD	Approved	SAGD
Phase 2	40,000	TBD	Approved	SAGD
VALUE CREATION INC.				
TriStar				
Value Creation is providing the ERCB with additional information supporting its application.				
Pilot	1,000		Application	SAGD

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
COLD LAKE REGION—IN SITU				
CANADIAN NATURAL RESOURCES LIMITED				
Primrose/Wolf Lake				
Canadian Natural will spend $830 million at Primrose and on future thermal projects (excluding Kirby) in 2011. The company is targeting a 12 per cent production increase at Primrose in 2011 versus 2010.				
Primrose East	32,000	[illegible]	Operating	CSS
Primrose North	30,000	2006	Operating	CSS
Primrose South	45,000	[illegible]	Operating	CSS
Wolf Lake	13,000	[illegible]	Operating	CSS
HUSKY ENERGY INC.				
Caribou				
Demonstration	10,000	[illegible]	Approved	SAGD
Tucker				
Husky is addressing production challenges by remediating older wells with new stimulation techniques, drilling new wells and initiating new start-up procedures.				
Phase 1	30,000	[illegible]	Operating	SAGD
IMPERIAL OIL LIMITED				
Cold Lake				
Imperial Oil is reporting higher bitumen production levels in the fourth quarter of 2010 versus the same period of 2009, in part due to higher reliability. The company says that the regulatory approval process for Nabiye advanced with ERCB scheme amendment and Alberta Utilities Commission approvals. Site clearing and road construction underway.				
LASER CSS Follow-up Process	TBD	[illegible]	Operating	CSS
Phase 1-10	110,000	[illegible]	Operating	CSS
Phase 11-13	30,000	2002	Operating	CSS
Phase 14-16	30,000	2015	Approved	CSS
KOCH EXPLORATION CANADA CORPORATION				
Gemini				
According to the Cold Lake Sun, the project is nearing the end of the regulatory process and is planning a first phase single well pair SAGD test.				
Commercial	10,000	[illegible]	Application	SAGD
Pilot	1,200	TBD	Application	SAGD
OSUM OIL SANDS CORP.				
Taiga				
Regulatory approval expected to be received mid-2011. OSUM has appointed Victor Roskey as chief financial officer. Roskey previously held senior management positions at EdgeStone Capital Partners, Enterra Energy Trust, Scotia Waterous and Citibank Canada.				
Phase 1	17,500	[illegible]	Application	SAGD
Phase 2	17,500	2016	Application	SAGD
PENGROWTH CORPORATION				
Lindbergh				
Pengrowth says that Lindbergh is one of four major operated growth areas that will enjoy parts of its $400-million 2011 capital program.				
Pilot	2,500	TBD	Application	SAGD
ROYAL DUTCH SHELL PLC				
Orion				
Phase 1	10,000	2008	Operating	SAGD
Phase 2	10,000	TBD	Approved	SAGD

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
PEACE RIVER REGION—IN SITU				
ANDORA ENERGY CORPORATION				
Sawn Lake				
Andora Energy owner PanOrient Energy Corp. says Andora will be conducting a strategic review process to enhance shareholder value that could result in a sale or merger.				
SAGD Demonstration	1,400	[illegible]	Approved	SAGD
NORTHERN ALBERTA OIL LTD.				
Sawn Lake				
CSS Pilot	TBD	TBD	Approved	CSS
PETROBANK ENERGY AND RESOURCES LTD.				
Dawson				
Initial two-well development to begin in the second quarter, with heating cycle expected to begin in the third quarter.				
THAI Demonstration	TBD	[illegible]	Approved	THAI
ROYAL DUTCH SHELL PLC				
Peace River				
Cadotte Lake	12,501	1986	Operating	CSS
Carmon Creek - Phase 1	40,000	2014	Announced	CSS
Carmon Creek - Phase 2	40,000	[illegible]	Announced	CSS
SOUTHERN PACIFIC RESOURCE CORP.				
Red Earth				
Southern Pacific and North Peace Energy have completed the plan of arrangement by which Southern Pacific acquires North Peace and all its assets, including Red Earth.				
Commercial	10,000	[illegible]	Announced	CSS
Pilot	1,000	2009	Operating	CSS
Pilot Expansion	3,000	[illegible]	Announced	CSS
SASKATCHEWAN REGION—IN SITU				
OILSANDS QUEST INC.				
Axe Lake				
A class action lawsuit has been launched against Oilsands Quest, alleging the company overstated the value of its assets between 2006 and 2009, resulting in artificial inflation of its trading price. The company says the claim is without merit. Oilsands Quest has established an "at the market" equity financing program. Funds raised will be used to finance re-abandonment of core holes and general corporate purposes. Near-term priority for Oilsands Quest is to convert its oil sands permits to a long-term lease and complete the re-abandonment program.				
Commercial	30,000	[illegible]	On Hold	SAGD
Reservoir Test	600	2008	On Hold	Test
SAGD Pilot	TBD	[illegible]	On Hold	SAGD
NORTH ATHABASCA REGION—UPGRADER				
CANADIAN NATURAL RESOURCES LIMITED				
Horizon				
Production suspended as regulators investigate the cause of major fire January 6. Canadian Natural says it expects no production from the site in February.				
Phase 1	114,000	[illegible]	Operating	Upgrader
Phase 2/3 - Phase 2A	5,000	2014	Approved	Upgrader
Phase 2/3 - Phase 2B	35,000	TBD	Approved	Upgrader
Phase 2/3 - Phase 3	45,000	TBD	Application	Upgrader
Phase 2/3 - Tranche 1	TBD	TBD	Operating	Upgrader
Phase 2/3 - Tranche 2	5,000	TBD	Construction	Upgrader
Phase 4	125,000	TBD	Announced	Upgrader
Phases 2/3	28,000	TBD	Approved	Upgrader

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
SUNCOR ENERGY INC.				
Base Operations				
Suncor says that higher bitumen rates from its mining and in situ operations, combined with improved upgrader reliability, resulted in record oil sands production rates in the fourth quarter of 2010.				
Millennium Coker Unit	97,000	[illegible]	Operating	Upgrader
Millennium Vacuum Unit	35,000	2008	Operating	Upgrader
U1 and U2	225,000	1967	Operating	Upgrader
Fort Hills				
Subject to sanction, Suncor and new venture partner Total will go ahead with the mining portion of the Fort Hills project, targeting a 2016 start-up. Suncor will spend $100 million on Fort Hills in 2011.				
Phase 1	145,000	[illegible]	Approved	Upgrader
Phase 2 & 3	145,000	2015	Approved	Upgrader
Voyageur Upgrader 3				
Suncor will spend $260 million on the Voyageur upgrader in 2011. Subject to corporate sanction, Suncor and new partner Total E&P Canada will restart construction of Voyageur, targeting start-up in 2016.				
Phase 1	127,000	[illegible]	Approved	Upgrader
Phase 2	63,000	TBD	Approved	Upgrader
SYNCRUDE CANADA LTD.				
Mildred Lake/Aurora North & South				
Canadian Oil Sands reports that 2010 production volumes were the second highest on record. The Syncrude project has a calculated capital budget of $2.4 billion for 2011, which will include the relocation or replacement of four out of five mine trains, completion of the Syncrude Emissions Reduction Project, tailings management and regular maintenance.				
Base Plant Stage 1 & 2 Debottlenecking	250,000	1978	Operating	Upgrader
Stage 3 Debottlecking	75,000	TBD	Announced	Upgrader
Stage 3 Expansion (UE-1)	100,000	TBD	Operating	Upgrader
VALUE CREATION INC.				
Terre de Grace				
Phase 1	33,600	TBD	Announced	Upgrader
Phase 2	33,600	TBD	Announced	Upgrader
Pilot	8,400	[illegible]	Approved	Upgrader

SOUTH ATHABASCA REGION—UPGRADER

NEXEN INC.				
Long Lake				
Although the bitumen production side of the Long Lake project continues to experience operational difficulties, partner OPTI Canada is reporting that upgrader units are performing consistently. Despite a brief interruption in November due to a gasifier trip, on-stream time averaged 90 per cent for the fourth quarter, up from 81 per cent in the third.				
Phase 1	58,500	[illegible]	Operating	Upgrader
Phase 2	58,500	2017	Approved	Upgrader
Phase 3	58,500	[illegible]	Announced	Upgrader
Phase 4	58,500	[illegible]	Announced	Upgrader
VALUE CREATION INC.				
TriStar				
Value Creation is providing the ERCB with additional information supporting its application.				
Pilot	840	[illegible]	Application	Upgrader

CURRENT PROJECT	CAPACITY (bbls/d)	START-UP	REGULATORY STATUS	TECHNOLOGY
INDUSTRIAL HEARTLAND REGION—UPGRADER				
NORTH WEST UPGRADING INC.				
Upgrader				
The Alberta government has sealed the deal with North West Upgrading and partner Canadian Natural Resources to supply the project with its royalty bitumen for processing.				
Phase 1	77,000	[illegible]	Approved	Upgrader
Phase 2	77,000	TBD	Approved	Upgrader
Phase 3	77,000	2015	Approved	Upgrader
SHELL ALBIAN SANDS				
Scotford Upgrader 1				
Mining feed for upgrader expansion has begun operations. Project partner Marathon Oil reports that expanded upgrader operations began the commissioning and start-up phase in late fourth quarter, and will continue through the first quarter of 2011.				
Commercial	158,000	[illegible]	Operating	Upgrader
Expansion	91,000	2011	Construction	Upgrader
Scotford Upgrader 2				
Shell withdrew its application for all phases of Scotford Upgrader 2 in fall 2010.				
Phase 1	97,750	[illegible]	Cancelled	Upgrader
Phase 2	97,750	TBD	Cancelled	Upgrader
Phase 3	97,750	TBD	Cancelled	Upgrader
Phase 4	97,750	TBD	Cancelled	Upgrader
STATOIL				
Strathcona				
Application withdrawn in December 2008.				
Phase 1	65,000	[illegible]	Cancelled	Upgrader
Phase 2	152,000	TBD	Cancelled	Upgrader
TOTAL E&P CANADA LTD.				
Northern Lights				
Previous project owner Synenco Energy withdrew the Northern Lights upgrader application in June 2008. Total purchased Synenco in August 2008.				
Phase 1	50,600	[illegible]	Cancelled	Upgrader
Phase 2	50,600	TBD	Cancelled	Upgrader
Strathcona				
Total says it will not proceed with its Strathcona upgrader.				
Debottlenecking	46,000	[illegible]	Application	Upgrader
Phase 1	138,000	2014	Approved	Upgrader
Phase 2	87,000	2018	Approved	Upgrader
VALUE CREATION INC.				
Heartland				
Construction suspended in September 2008.				
Phase 1	46,300	[illegible]	On Hold	Upgrader
Phase 2	46,300	TBD	Approved	Upgrader
Phase 3	46,300	[illegible]	Approved	Upgrader

Glossary of oil sands terms

API
An American Petroleum Institute measure of liquid gravity. Water is 10 degrees API, and a typical light crude is from 35 to 40. Bitumen is 7.5 to 8.5.

Barrel
The traditional measurement for crude oil volumes. One barrel equals 42 US gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

Bitumen
Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oilsand, but saturation varies.

Condensate
Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

Cyclic steam stimulation
For several weeks, high-pressure steam is injected into the formation to soften the oilsand before being pumped to the surface for separation. The pressure created in the underground environment causes formation cracks that help move the bitumen to producing wells. After a portion of the reservoir has been saturated, the steam is turned off and the reservoir is allowed to soak for several weeks. Then the production phase brings the bitumen to the surface.

Density
The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m^3 is considered light to medium crude — oil above this density is deemed as heavy oil or bitumen.

Diluent
see *Condensate*

Established recoverable reserves
Reserves recoverable under current technology and present and anticipated economic conditions, plus that portion of recoverable reserves that is interpreted to exist, based on geological, geophysical, or similar information, with reasonable certainty.

Established reserves
Reserves recoverable with current technology and present and anticipated economic conditions specifically proved by drilling, testing, or production, plus the portion of contiguous recoverable reserves that are interpreted to exist from geological, geophysical, or similar information with reasonable certainty.

Extraction
A process, unique to the oil sands industry, which separates the bitumen from the oilsand using hot water, steam, and caustic soda.

Froth treatment
The means to recover bitumen from the mixture of water, bitumen, and solids "froth" produced in hot water extraction (in mining-based recovery).

Gasification
A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy byproducts.

Greenhouse gases
Gases commonly believed to be connected to climate change and global warming. CO_2 is the most common, but greenhouse gases also include other light hydrocarbons (such as methane) and nitrous oxide.

Initial established reserves
Established reserves prior to the deduction of any production.

Initial volume in place
The volume calculated or interpreted to exist in a reservoir before any volume has been produced.

In situ
Latin for "in place." In situ recovery refers to various methods used to recover deeply buried bitumen deposits.

In situ combustion
A displacement enhanced oil recovery method. It works by generating combustion gases (primarily CO and CO_2) downhole, which then "pushes" the oil towards the recovery well.

Lease
A legal document from the province of Alberta giving an operator the right to extract bitumen from the oilsand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

Muskeg
A water-soaked layer of decaying plant material, one to three metres thick, found on top of the overburden.

Oil Sands
Bitumen-soaked sand, located in four geographic regions of Alberta: Athabasca, Wabasca, Cold Lake, and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

Overburden
A layer of sand, gravel, and shale between the surface and the underlying oilsand. Must be removed before oil sands can be mined. Overburden underlies muskeg in many places.

Pilot plant
Small model plant for testing processes under actual production conditions.

Proven recoverable reserves
Reserves that have been proven through production or testing to be recoverable with existing technology and under present economic conditions.

Reclamation
Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

Remaining established reserves
Initial reserves less cumulative production.

Royalty
The Crown's share of production or revenue. About three quarters of Canadian crude oil is produced from lands, including the oil sands, on which the Crown holds mineral rights. The lease or permit between the developer and the Crown sets out the arrangements for sharing the risks and rewards.

Steam assisted gravity drainage (SAGD)
An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

Synthetic crude oil
A manufactured crude oil comprised of naphtha, distillate, and gas oil-boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

Tailings
A combination of water, sand, silt, and fine clay particles that is a byproduct of removing the bitumen from the oilsand.

Tailings settling basin
The primary purpose of the tailings settling basin is to serve as a process vessel allowing time for tailings water to clarify and silt and clay particles to settle, so the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

Thermal recovery
Any process by which heat energy is used to reduce the viscosity of bitumen in situ to facilitate recovery.

Toe to heel air injection (THAI)
An in situ combustion method for producing heavy oil and oilsand. In this technique, combustion starts from a vertical well, while the oil is produced from a horizontal well having its toe in close proximity to the vertical air-injection well. This production method is a modification of conventional fire flooding techniques in which the flame front from a vertical well pushes the oil to be produced from another vertical well.

Truck-and-shovel mining
Large electric or hydraulic shovels are used to remove the oilsand and load very large trucks. The trucks haul the oilsand to dump pockets where it is conveyed or pipelined to the extraction plant. Trucks and shovels are more economic to operate than the bucket-wheel reclaimers and draglines they have replaced at oil sands mines.

Upgrading
The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

Vapour extraction (VAPEX)
VAPEX is a non-thermal recovery method that involves injecting a gaseous hydrocarbon solvent into the reservoir where it dissolves into the sludge-like oil, which becomes less viscous (or more fluid) before draining into a lower horizontal well and being extracted.

Viscosity
The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.

CONTACTS

Oil Sands Producers

• Alberta Oilsands	www.aboilsands.ca
• Albian Sands Energy	www.albiansands.ca
• Andora Energy	www.andoraenergy.com
• Athabasca Oil Sands	www.aosc.com
• Baytex Energy	www.baytex.ab.ca
• Canadian Natural Resources	www.cnrl.com
• Cenovus Energy	www.cenovus.com
• Chevron Canada	www.chevron.ca
• Connacher Oil and Gas	www.connacheroil.com
• ConocoPhillips Canada	www.conocophillips.ca
• Devon Canada	www.dvn.com
• Enerplus Resources Fund	www.enerplus.com
• E-T Energy	www.e-tenergy.com
• Excelsior Energy	www.excelsiorenergy.com
• Husky Energy	www.huskyenergy.ca
• Imperial Oil	www.imperialoil.ca
• Ivanhoe Energy	www.ivanhoe-energy.com
• Japan Canada Oil Sands	www.jacos.com
• Korea National Oil Corporation	www.knoc.co.kr
• Laricina Energy	www.laricinaenergy.com
• Marathon Oil	www.marathon.com
• MEG Energy	www.megenergy.com
• Nexen	www.nexeninc.com
• North Peace Energy	www.northpec.com
• North West Upgrading	www.northwestupgrading.com
• N-Solv	www.n-solv.com
• Occidental Petroleum Corporation	www.oxy.com
• Oilsands Quest	www.oilsandsquest.com
• OPTI Canada	www.opticanada.com
• OSUM Oil Sands	www.osumcorp.com
• Pan Orient Energy	www.panorient.ca
• Patch International	www.patchenergy.com
• Pengrowth Energy Trust	www.pengrowth.com
• Petro-Canada	www.petro-canada.com
• Petrobank Energy and Resources	www.petrobank.com
• Shell Canada	www.shell.ca
• Southern Pacific Resource	www.shpocific.com
• Statoil Canada	www.statoil.com
• Suncor Energy	www.suncor.com
• Sunshine Oilsands	www.sunshineoilsands.com
• Syncrude	www.syncrude.ca
• Talisman Energy	www.talisman-energy.com
• Teck Cominco	www.teckcominco.com
• Total E&P Canada	www.total-ep-canada.com
• UTS Energy	www.uts.ca
• Value Creation Group	www.vctek.com

Associations/Organizations

• Alberta Building Trades Council	www.albertabuildingtrades.com
• Alberta Chamber of Resources	www.acr-alberta.com
• Alberta Chambers of Commerce	www.abchamber.ca
• Alberta Energy	www.energy.gov.ab.ca
• Alberta Energy Research Institute	www.aeri.ab.ca
• Alberta Environment	www.environment.alberta.ca
• Alberta Finance and Enterprise	www.finance.gov.ab.ca
• Alberta Research Council	www.arc.ab.ca
• Alberta's Industrial Heartland Association	www.industrialheartland.com
• Canadian Association of Geophysical Contractors	www.cagc.ca
• Canadian Association of Petroleum Producers	www.capp.ca
• Canadian Heavy Oil Association	www.choa.ab.ca
• Canadian Oil Sands Network for Research and Development	www.conrad.ab.ca
• Energy Resources Conservation Board	www.ercb.ca
• In Situ Oil Sands Alliance	www.iosa.ca
• Lakeland Industry and Community Association	www.lica.ca
• Natural Resources Conservation Board	www.nrcb.gov.ab.ca
• Oil Sands Developers Group	www.oilsandsdevelopers.ca
• Oil Sands Leadership Initiative	www.osli.ca
• Petroleum Technology Alliance Canada	www.ptac.org

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